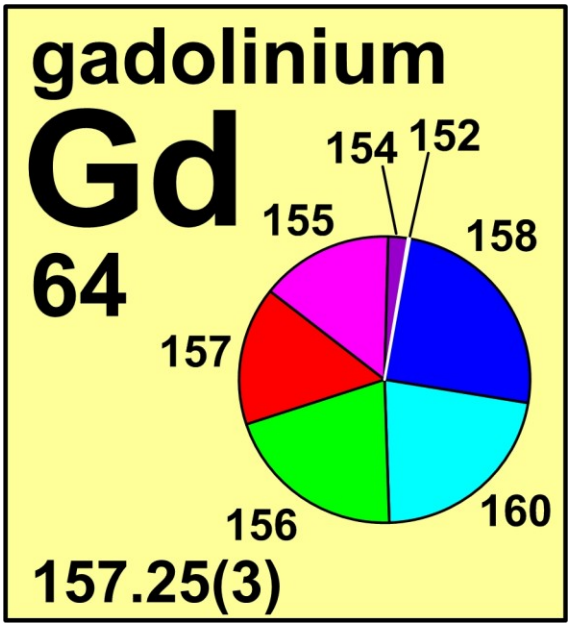
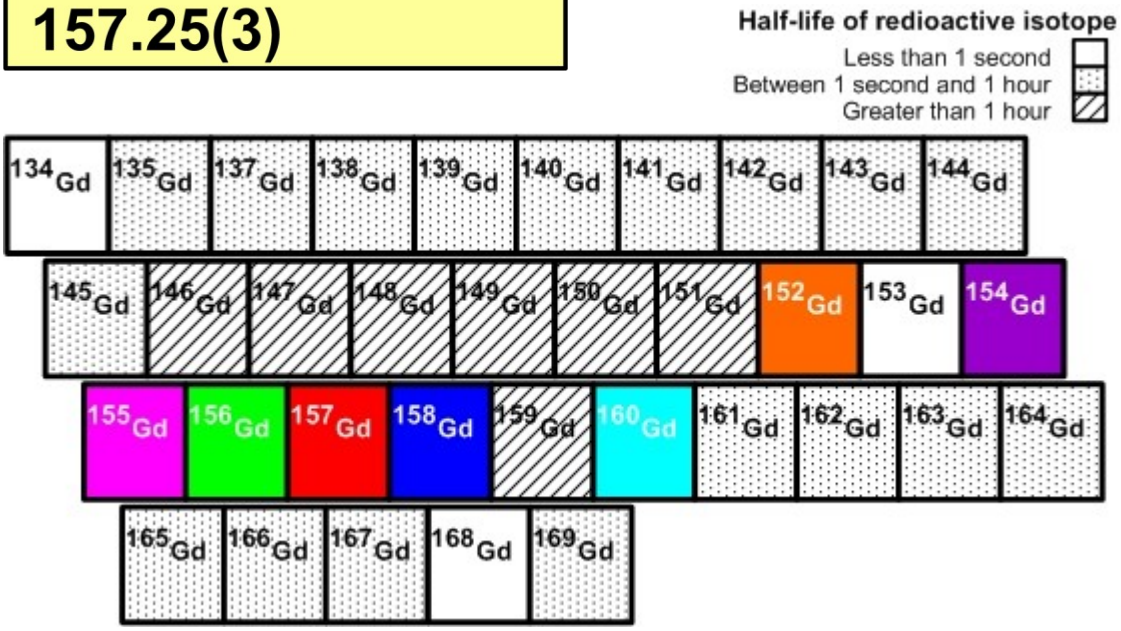
gadolinium



Stable isotope	Atomic mass*	Mole fraction
^{152}Gd	151.919 791	0.0020
^{154}Gd	153.920 8656	0.0218
^{155}Gd	154.922 622	0.1480
^{156}Gd	155.922 1227	0.2047
^{157}Gd	156.923 9601	0.1565
^{158}Gd	157.924 1039	0.2484
^{160}Gd	159.927 0541	0.2186

* Atomic mass given in unified atomic mass units, u.



Important applications of stable and/or radioactive isotopes

Isotopes in medicine

1) Gadolinium has the highest neutron cross-section among any stable nuclides, 61,000 barns for ^{155}Gd and 259,000 barns for ^{157}Gd. ^{157}Gd has been used to target tumors in neutron therapy. This element is very effective for use with neutron radiography and in shielding of nuclear reactors.
2) ^{153}Gadolinium is produced in a nuclear reactor from elemental europium or enriched gadolinium targets. It has a half-life of 240±10 days and emits gamma radiation with strong peaks at 41 keV and 102 keV. It is used in many quality assurance applications, such as line sources and calibration phantoms, to ensure that nuclear medicine imaging

systems operate correctly and produce useful images of radioisotope distribution inside the patient. It is also used as a gamma ray source in X-ray absorption measurements or in bone density gauges for osteoporosis screening, as well as in the Lixiscope portable X-ray imaging system.

Figure 1: This is a picture of a patient undergoing neutron therapy. The red lasers cross to target the patients' tumor. A high beam of neutrons is fired at the target to stop the growth and eradicate the tumor.

**Applications of gadolinium isotopes are still being researched and this page will be updated shortly. **